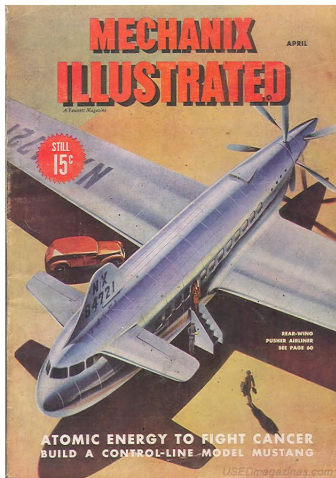




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Atomic Sub Launches Atom Raider—Page 74



Tom McCahill Tests the Queen Elizabeth!

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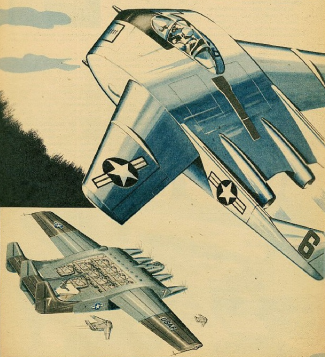
LAZY MAN'S POWER MOWER
tends lawn, does chores, runs
errands in air-cooled luxury

Page 70

**EXCLUSIVE! HOW TO SCORE
BUILD MODEL STEAM CAR**

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Flying Flattops



Aerial carriers are another solution for interception of fast long-range enemy A-bomb raiders.

■ The shadow of the A-bomb looms heavily over American skies. Yet if we depend on the conventional radar-flare system to defend our major areas from a first-A attack, it would have to bring the time of the Normandy invasion to protect dozens of our most important cities, and that with only 40 to 50 percent effectiveness. Guided missiles, which appear to be our best bet from the standpoint of accuracy and economy, are at least three years in the future.

The place to stop the Red bombers headed for Detroit is over the Arctic Ocean, not over Lake Huron. This problem calls for a type of interceptor similar to an aircraft carrier, in altitude and at conditions of speed and altitude where the carrier is out of its element. Thus the solution, for the time being, is to project aircraft carrier characteristics into the sky to meet the enemy much less than halfway.

Experience with our B-36 bombers indicated that the current type of fighter suffers from certain disadvantages when attacking a bomber, and one of the best ways to restore its position of combat superiority and still permit it to be used against bombers a long way from the target, is the flattop in the sky.

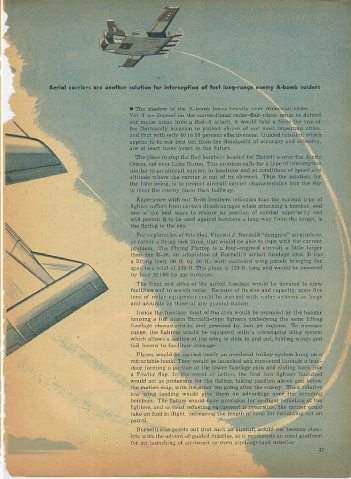
For explanation of this idea, Vincent J. Bernelli "designed" an airplane, or rather a thing (ask first, that) would be able to cope with the current position. The Flying Flattop is a four-engined aircraft a little larger than the B-28, in adaptation of General's aircraft design idea. It has a flying body 90 ft. by 60 ft., with outward wing panels bringing the span to a total of 159 ft. The plane is 129 ft. long and would be powered by four 21,000-hp gas turbines.

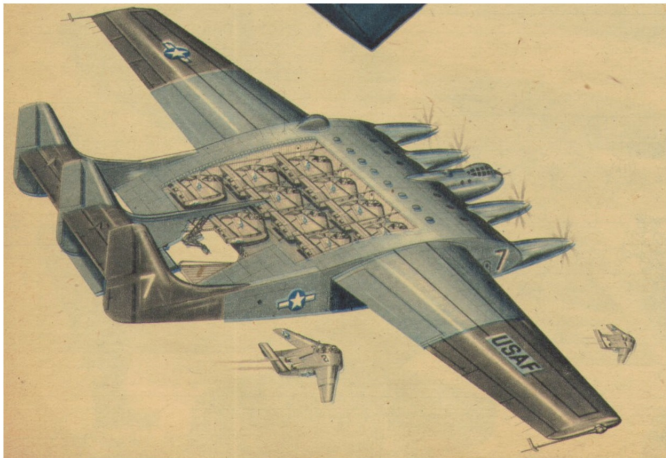
The front end, also at the airfoil discharge, would be altered to crew facilities to search radar. Because of its size and capacity, some five tons of radar equipment could be carried with radar antenna in large and movable in those of any current design.

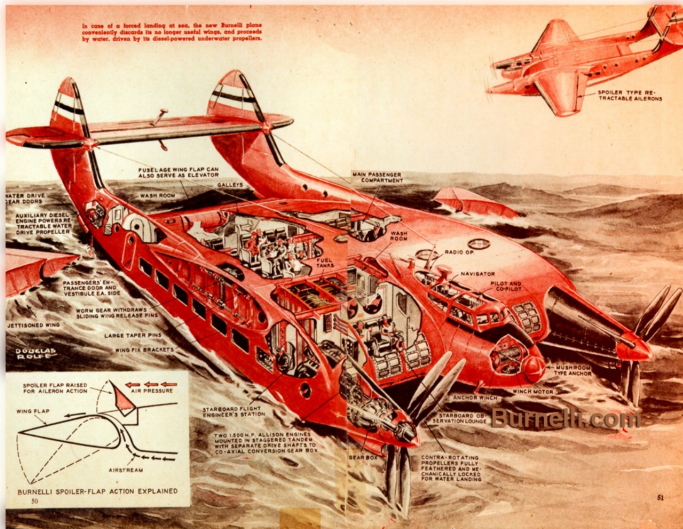
Inside the fuselage, most of the crew would be occupied in the house, forming a half dozen Bernelli-type fighters employing the same flying (change) characteristics and powered by two jet engines. To increase range, the fighters would be equipped with a retracting wing system which allows a section of the wing to slide in and out, folding wings and tail booms to facilitate storage.

Planes would be carried inside an overhead hoist system hung on a retractable beam. They would be launched and recovered through a track, forming a number of the lower fuselage in and sliding back like a Power Day. In the event of action, the first two fighters launched would act as protectors for the others, taking position above and below the carrier ship, with the other two going after the enemy. The retracting wing loading would give them an advantage over the intercepting bombers. The factory would have provision for modification of the fighters, and as much refueling equipment is required, the carrier could take on fuel in flight, increasing the length of time for intercepting and so patrol.

Bernelli also points out that such an aircraft would not become cluttered with the advent of guided missiles, as it represents an ideal platform for air launching of air-to-air or even air-to-ground missiles.







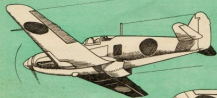
Burnelli 1940's design enables a plane to float safely with comfort for passengers

AIR PROGRESS

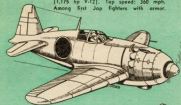
By DOUGLAS ROLFE

Japanese Air Force

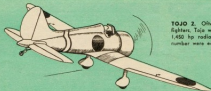
WORLD WAR II FIGHTERS



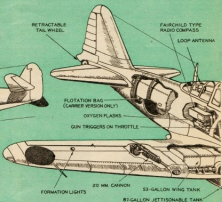
TONY. This important Jap fighter was only one powered with a liquid-cooled engine (1,175 hp V-12). Top speed: 360 mph. Among 5th Jap fighters with armor.



JACK 11. This land-based navy fighter had a 1800 hp radial engine; four 20-mm cannons; top speed, about 380 mph. Called "Raider" [Thunderbolt]; superficial resemblance to P-47.



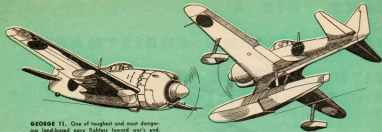
TOJO 2. Often rated as one of most potent Jap fighters, Tojo was produced only in limited numbers. 1,450 hp radial; fuselage and 2 wing Mfgm. A number were equipped with 40-mm cannon in wings.



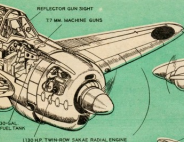
ZEKE. The Mitsubishi 52, Type "O," was most widely produced, most widely preferred Jap fighter. Completely unarmored and without bullet-proof tanks, it was vulnerable to attack but, thanks to its extreme maneuverability, a formidable weapon in air combat.



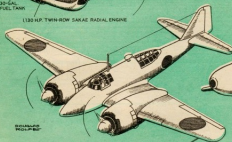
CLAUDE. Nakajima Type 9b was standard Jap fighter prior to Zeke. 800 hp radial engine, no armor or fuel tank protection but fast and maneuverable. Served in Sino-Japanese war.



GEORGE 11. One of toughest and most dangerous land-based navy fighters toward war's end. 1,995 hp 18-cylinder radial; 4 20-mm cannons; heavily armored; top speed about 370 mph.



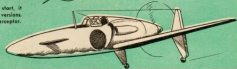
RANDY. 50B is lightest stage of close of hostilities, this heavily armed, long-range, twin-engine fighter was powered with two 2,700 hp 18-cylinder radials—top speed of 437 mph.



SAKA BOMB. The Saka piloted bomb had solid fuel rocket 1760 lb. thrust engine and mounted 2,200 lb. war head. Top speed 535 mph. Launched from air.

DINAH. Faster than Allied types at war's start, it came in both reconnaissance and fighter versions. Later was used as a high-altitude interceptor.

SHINDEN J7W1. This unusual canard-type Navy interceptor was in flight-test stage at war's end. 2,130 hp radial, 6-bladed pusher propeller; 495 mph tops.



A-Power Transport

Based on Howard Hughes' gigantic flying boat, the atom-powered airplane is depicted here using as driving energy heat from nuclear fission which operates its hot-air turbines. Work on the development of such a powerplant is now being done by General Electric Co.; Consolidated-Vultee Aircraft Corp. is charged with building the airframe.



FRANK TINKLEY



View of Hughes "Hercules" cut away to show possible layout of atomic powerplant using air as operating medium.

1. Air inlet scoop, cushioned stop flaps to avoid spray.
2. Air is conducted forward through ducting.
3. Large axial compressor feeds air into heat exchanger.
4. Shielded atomic pile with automatic controls generates heat.
5. Liquid sodium-potassium alloy circulating through zirconium tubes transfers atomic heat to air as it passes through coils of shielded heat exchanger.
6. Hot compressed air actuates turbines which drives compressor, powers pumps, generator current, etc.
7. Heavily insulated pressure ducts pipe hot compressed air to individual powerplants in wings.
8. Waste gate with by-pass to exhaust duct diverts air for throttle control.
9. High-speed turbine drives propellers.
10. Gearing reduces turbine rpm to prop speed.
11. Waste air duct inside leading edge of wing provides thermal anti-icing.
12. Auxiliary jet engine provides heat and power for starting.

McCailli sounds on on women drivers!

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GENERAL ELECTRIC BUILDS AN INCREDIBLE 'MACHINE MAN'

He's 18 ft. tall,
walks & works like a man,
can lift up to 8,000 pounds!



How to Soup Up Your Car

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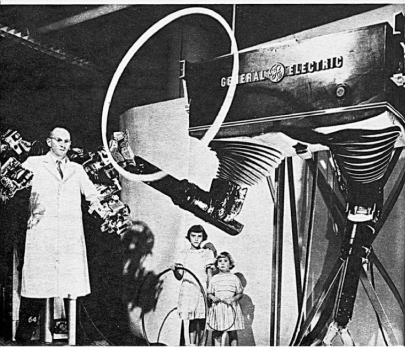
TV



COVER STORY

GENERAL ELECTRIC'S MACHINE MAN

This incredible 18-foot tall steel skeleton with a man inside will be able to lift up to 8,000 pounds!



THE incredible machine man, now being developed by General Electric under an Army contract, will be able to stride effortlessly through swamps, step over cars or carry telephone poles up mountains as easily as if the poles were matchsticks.

The machine, known as the pedipulator, will walk and work like a man, and be capable of lifting up to 8,000 pounds. Inside, in a control harness linking his arms and legs with those of the machine, a human operator will manipulate the 18-foot steel skeleton as if it were a part of his own body. Through the control linkages, the machine will sense each movement of the operator and imitate them.

If the man moves his left foot, it will do the same. If he raises his right foot to step over a fallen tree, so will the machine. Should he lean over, it will too.

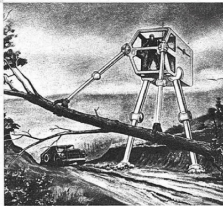
The machine man will respond instantly to each movement and at the same time reflect a proportion

of the energy it exerts to perform its work. This "force feedback" can be adjusted so the operator feels only as much of the actual effort as he wants. If a tree weighs 500 pounds, the man can adjust the ratio so he will feel only 50 pounds.

GE engineers expect to complete a full-scale but abridged model of the machine man by February. This first model, with its "legs" fastened to the ground, will be used in forward-backward balancing tests, which the engineers think will be the most critical.

Ralph S. Mosher, mechanical engineer for GE and innovator of machine man says that the basic concept has already been demonstrated successfully in the Handyman, a pair of mechanical arms and hands devised six years ago.

If the first version works, GE will build a model that will move just like a man. *



HANDYMAN. left, twirls hula hoop in agility demonstration by its inventor, GE engineer Ralph S. Mosher. Operator stands in master control harness, goes through same motions he wants Handyman to perform. Top of this page, Mosher works on mock-up of machine man GE will build in next five months. Above, how the machine man may look clearing road after storm.

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BUILD A GAS MODEL
OF THIS PIPER SKYSEDAN
SEE PAGE 122

IS THERE A SUPER ATOM BOMB?

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...many succeeded; range of the windmill because of the short not venture far out from shore unless flown from the deck of a ship.

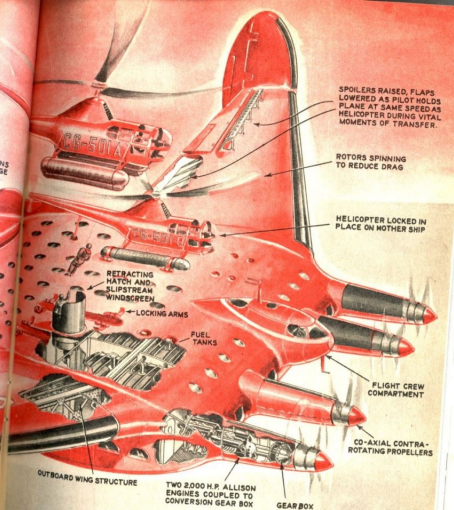
But thanks to the imagination and perseverance of the Coast Guard and the airplane design genius of Vincent Burnelli, this limitation has been overcome. The new plan is the "pickaback" idea in a totally new conception; the combining of a large, long-range land-helicopter, which ride atop its enormous wing until the destination is reached then release themselves to go about their business, later returning to their places aboard the plane.

Theoretically and practically, there is no reason why this cannot be accomplished. Multi-flown, and a suitable carrier plane is on the designing board of Burnelli, as a big sister to his famous CBY-3 (See "Something New On The Wing," MI, Dec. '45).

The new plane, which has not yet been given a name or designation, will be almost twice as large as the CBY, and considerably



bigger than the B-29. It will follow the flying wing principle of all Burnelli's airplanes, with wing and fuselage (Burnelli doesn't like the word "fuselage"; he says it implies an airplane design that's as obsolete as the biplane) an integral airfoil unit contributing to the lift. Clyde Pangborn, famous flyer and test pilot who has flown many of Burnelli's ships,



says that this principle accounts for the amazing combination of speed, payload, handling ease and high safety factors inherent in the CBY.

The new ship will have a span of 200 feet, gross weight of 140,000 lbs. and a cargo and passenger space of 17,000 cubic

feet—roughly equivalent to five box cars. Driven by four contra-rotating propellers geared to eight intra-wing engines delivering a total of 16,000 hp, it will cruise at 310 mph, and have a 4,000-mile range.

As a transport it will have a capacity of 160 passengers, and as a pickaback, 60.

...primarily because of the short range of the windmill machines which could not venture far out from shore unless flown from the deck of a ship.

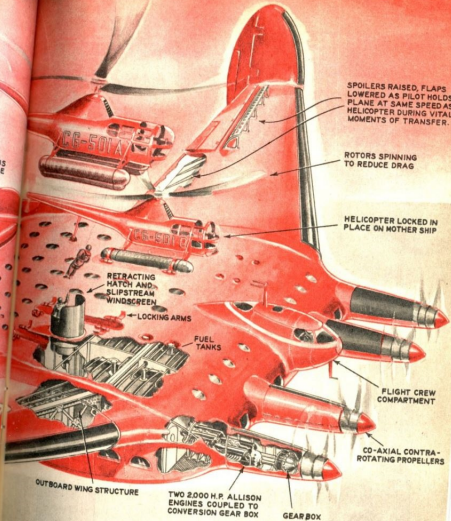
But thanks to the imagination and perseverance of the Coast Guard and the airplane designing genius of Vincent Burnelli, this limitation has been overcome. The new plan is the "pickaback" idea in a totally new concept-based airplane with powerful, eight-passenger helicopters, which ride atop its enormous wing until the destination is reached then release themselves to go about their business, later returning to their places aboard the plane.

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DEADLY 'SKY SNIPER' ON COMBAT RAID—
IS THIS OUR NEWEST SECRET WEAPON?

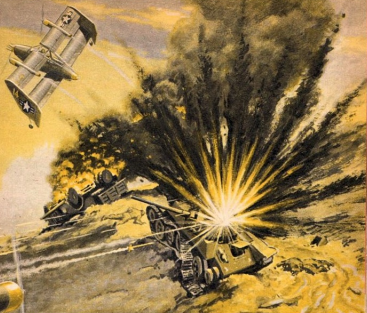
CONSTRUCT YOUR OWN CERAMIC KILN



FRANK TINSLEY

SKY SNIPER —

Newest Secret Weapon?



A cheap, dependable light plane, heavily armed and armored, flown by Army personnel, to give our soldiers the close support they badly need.

By Frank Tinsley

LETS give our fighting GI's a new deal in air protection. The Air Force is doing a good job but its planes aren't capable of giving the infantry the close ground support it needs. We want planes that can come down and fight side-by-side with the men, cheap planes that can be produced in large numbers without ruining our economy. And let's put them in the hands of the Army, itself.

Such a plane must be a sort of aerial jeep, adaptable to a wide variety of uses. It must be quickly convertible to attack, liaison, photographic and possibly, night fighting missions.

It should be able to deliver light loads of rations, water and ammunition to isolated units, lay phone lines and evacuate casualties. It need not be particularly fast but must be highly maneuverable to dodge obstacles and ground fire. It should be virtually unkillable, have a really low landing speed and be equipped with cross-wind landing gear.

It should be armored against flak fragments and small arms fire, should mount a battery of anti-personnel machine guns, carry rockets and a variety of bombs. The plane should be designed for cheap, fast production and limited life.

Quite an order, isn't it? Can a light plane really be built to meet such extreme specifications? Probably not—if we stick to conventional layouts. There is, however, a configuration that might fill the bill. It is the duo-mono wing arrangement invented in France and sponsored in this country by the Pardel Development Corporation of New York. Looking like a cross between a widely staggered biplane and tandem wing setup, the two duo-mono lifting surfaces function as a single slotted wing. Four basic advantages are claimed for the duo-mono principle.

First, the wing is stall proof, even at angles as high as 30 degrees.

Second, with power on, the slipstream of the twin propellers gives high-speed control at low forward speeds. This results in vastly increased lift.

Third, there is reduced fuselage drag in any flight attitude, attributable to delayed boundary layer separation effect.

Fourth, in low-speed landing approaches, the plane becomes one big air brake when the stick is pulled back. With full power on, this results in an almost helicopter-like hovering.

A light attack-plane design, improving upon the duo-mono layout, is now being developed. In this model the addition of end plates between the wingtips encloses the slipstream in a virtual wind tunnel. This not only strengthens the structural setup but also extracts maximum lift from the fast-moving flow of air. Although tiny in size—17 feet long, 34½ feet in span, 6½ feet high—the dual lifting surfaces have an area of 322 feet and are loaded lightly enough to permit a landing speed of about 20 mph.

This is no aerial baby buggy, however. With a gross weight of nearly 5,000 pounds, the duo-mono T-1 lifts 1,850 pounds of armor and armament and carries fuel for one hour. Its twin gas turbines, also armored, swing 12-foot propellers and drive the little fighter through the air at better

than 150 mph. The pilot is completely enclosed in plastiglass armor and bullet-proof glass. He is armed with six .30-caliber machine guns in the lower wing roots, sixteen 3-inch rockets in twin automatic launchers and 250 pounds of bombs of various types.

The T-1 is intended to carry out short, local combat missions from hastily prepared strip bases close behind the front lines. A rugged leaf-spring undercarriage of the bicycle type fitted with dual, castoring wheels permits cross-wind landings on rough runways. Easily changed, plastic nose cones are equipped with a variety of specialized armament, cameras, etc. Light, compact radar installations now under development may even permit all-weather operation. A hinged tail cone tilts upward for rapid rearming and refueling. The gas tank, holding 85 gallons, is self-sealing and explosion resistant. With the empty rocket magazines removed, the tail section will accommodate a stretcher case on a litter.

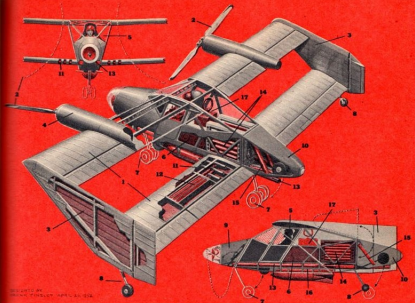
Let's see how these deadly little lightweights would operate in actual battle. Our infantry units attacking an enemy hilltop are stopped at a strong point. The enemy is dug in so deeply that neither mortar nor howitzer fire can disturb them. A frontal assault would cost dearly. Yet the attack schedule must be adhered to or neighboring elements will be left wide open. What to do?

The infantry C.O. gets on the phone. Over the air-laid wire goes a concise report and map references locating the enemy bunker.

Back in the Divisional C.P., the Air Controller glances at his operations board. A colored marker shows T-1 No. 28 in the neighborhood, just completing a mission. The pilot obviously knows the terrain in that area so he's elected. A pointed finger and the word, napalm, starts a sergeant talking over an airstrip phone. The orders are clipped, codified, as hundreds of planes are in the air and the traffic on the board is heavy.

T-1 No. 28 touches down and is flagged to a halt in the rearming area. The ground crews are on her almost before she stops rolling. The tail cone is lifted and the rocket magazines slid out on to a flatbed jeep. A fuel truck tops off the fighter's tank. Meanwhile, loaded dollies replace the rocket weight with napalm fire bombs. The location of the enemy bunker is pinpointed on the pilot's large-scale map. In a matter of minutes, he takes off and heads for his new objective.

On the shell-pitted hillside, waiting infantrymen watch the bat-like cloud of



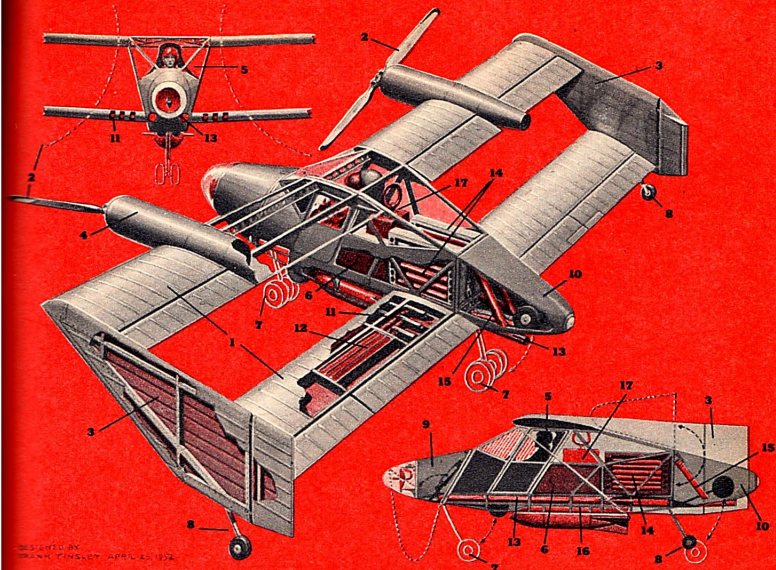
1: Duo-mono wing arrangement acts like a slotted wing. It generates high lift for slow landing and is stall proof. 2: Slipstream of the large diameter prop blankets the entire wing surfaces with forced air flow. Wind-tunnel effect increases maneuverability at low speeds. 3: End plates confine the fast flowing slipstream to the wing surfaces, utilizing 100% of their lifting efficiency. 4: Two 200-hp gas turbines in armored nacelles provide compact, low vibration power plants. 5: Pilot's cockpit is armored with moulded fibreglass plastic and bullet-proof glass. Ejected-out sides permit downward vision. 6: An 85-gallon self-sealing tank holds fuel for one hour at full throttle. It is fitted with a new explosion inhibiting device. 7: Dual-wheel, bicycle-type landing gear retracts upward into the fuselage. It has a simple leaf-spring strut and a combination shock absorber and actuator. 8: Side wheels, mounted on fixed leaf-springs, prevent

tipover while taxiing. 9: Detachable nose cones of moulded plastiglass carry all-weather radar, camera units and a variety of armaments. They are easily switched for special missions. 10: The moulded plastiglass tail cone is fitted with a tail light. It tilts upward to permit easy loading of rocket magazines, fares, etc. 11: The fixed battery of six .30-cal. machine guns provides large volume, economical ground fire. 12: The machine-gun ammunition is ground loaded in detachable trays, easily changed. A hinged plate covers entire gun installation. 13: Twin automatic launching tubes fire 3-inch anti-tank rockets. Rock blast is vented under tail. 14: A separate rocket magazine feeds into each of the launchers. 15: Twin tubes hold fares for night fighting and photography. 16: The 8-by-7-foot bomb bay accommodates a variety of H.E., fragmentation and napalm bombs. 17: There's two-way voice communication and navigational homing circuits.

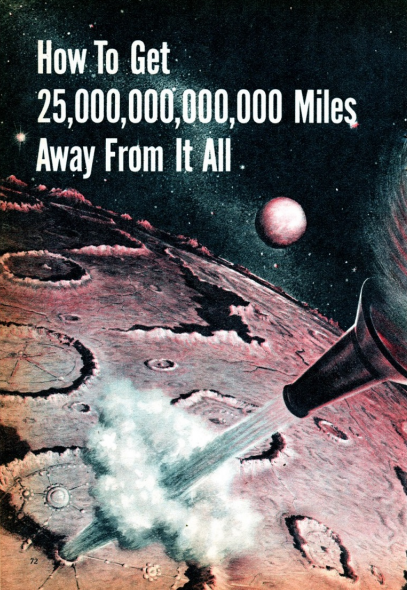
planes and try to pick out their particular baby. Then a T-1 swoops and the bunker erupts in a sea of searing, orange flame. Enemy fire ceases and a few fleeing figures try to outstrip the spreading death. With relieved grins, the tired doughfies rise from their shelters and head for the summit. One hit—no errors—no casualties.

This is the sort of down-to-earth, local air support that our troops should and must have. It can best be supplied by low-cost,

limited-life planes of the type described. And it should be monitored and controlled by the people it works for—the ground forces. Let the Air Force take care of the fast stuff, rear area interdiction and strategic bombing. That's their job. But let the doughboys' planes be run by their logical directors—the doughboys. It's high time we forgot interservice rivalries and got down to the brass tacks of military logic. Let's revive the Army Air Corps! *



How To Get 25,000,000,000,000 Miles Away From It All

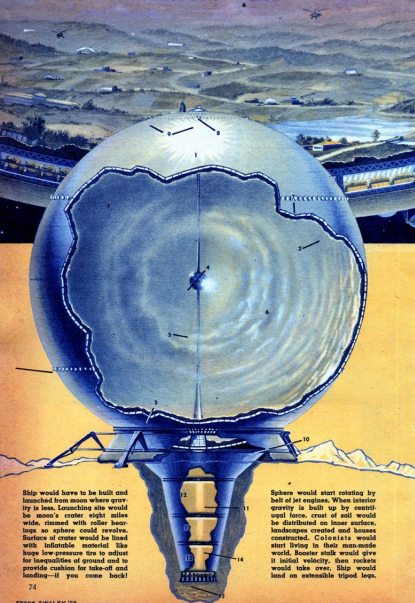


It's not easy. First build
a space ship like this one,
then, at the speed of light,
it will take 30 generations
to reach the nearest star.

By Frank Tinsley

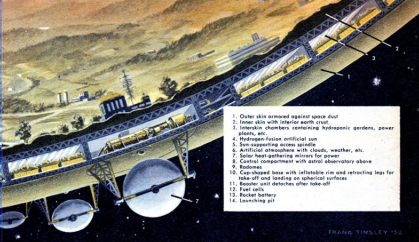


FEW people realize the illimitable size of the cosmos in which they live. Even the nearest stars are separated from us by spaces so immense as to be almost incomprehensible to earthbound minds. Beyond lie black voids so vast that our whole solar system—sun, planets and satellite moons—is but a tiny pinpoint of light in a single galaxy of stars! The distances involved are so enormous that they are computed not in miles



Ship would have to be built and launched from moon where gravity is less. Launching site would be moon's crater eight miles wide, rimmed with roller bearings so sphere could revolve. Surface of crater would be lined with inflatable material like huge low-pressure tire to adjust for inequalities of ground and to provide cushion for take-off and landing—if you come back!

Sphere would start rotating by belt of jet engines. When interior gravity is built up by centrifugal force, crust of soil would be distributed on inner surface, landscapes created and houses constructed. Colonists would start living in their man-made world. Booster stalk would give it initial velocity, then rockets would take over. Ship would land on extensible tripod legs.



1. Outer skin armored against space dust
2. Inner skin with interior earth crust
3. Interplanetary chambers containing hydroponic gardens, power plants, etc.
4. Hydrogen-fusion artificial sun
5. Sun-supporting across spindle
6. Artificial atmosphere with clouds, weather, etc.
7. Solar heat-gathering mirrors for power
8. Central compartment with satellite observatory above
9. Redomes
10. Cap-shaped base with inflatable rim and retracting legs for take-off and landing on spherical surfaces
11. Booster unit detaches after take-off
12. Fuel cells
13. Rocket battery
14. Launching gill

FRANK TINSLEY '52

but in time. Astronomy's unit of measurement is the light-year, the distance traveled by light in one year at a speed of 186,000 miles per second. Multiply this speed in a year (670,000,000 mph) by 24 hours and then by 365 days and you have the basic unit. It is a cute, little pocket ruler 5,880,000,000,000 miles in length!

There are eight stars within ten such light years of our sun. Of these stellar neighbors, Alpha Centauri and Proxima Centauri are the nearest. Faint pinpoints of light visible only by telescope, they are a modest 4.3 light-years away.

Starting with a space ship of present day rocket performance, a top speed of around 6.2 miles per second, Dr. L. R. Shepherd, Technical Director of the British Interplanetary Society, calculates that at that velocity it would take about 130,000 years to reach one of these stars. Alongside of this, a trip to the moon would be a mere ferryboat ride! This trip would entail the birth and death of some 30 generations en route.

To contain such a colony, its animals, plant life, etc., the space vehicle would have to be a modern Noah's ark. The problems involved in maintaining artificial atmosphere and armoring the hull against cosmic dust particles make a spherical form almost obligatory. It would have to be enormous with a minimum diameter of ten miles. It would have to revolve around its directional axis to provide artificial gravity

through centrifugal force, yet have fixed polar areas for astronomical observation, navigation, etc. It would have to take off from the moon where the gravitational pull is only one-sixth that of earth.

In the sphere, life would be conducted as nearly as possible as it is on earth. The whirling globe would contain towns and countryside, soil for crops, trees, lakes, roads and houses. There should be a sky above, an artificial reproduction of our atmosphere with a sun, moon, stars, day and night and even the change of seasons. In short, our space vehicle must be a small, self-contained world with all the features of our natural one. The only major difference would be that our colonists must inhabit the inside of their man-made planet instead of its exterior!

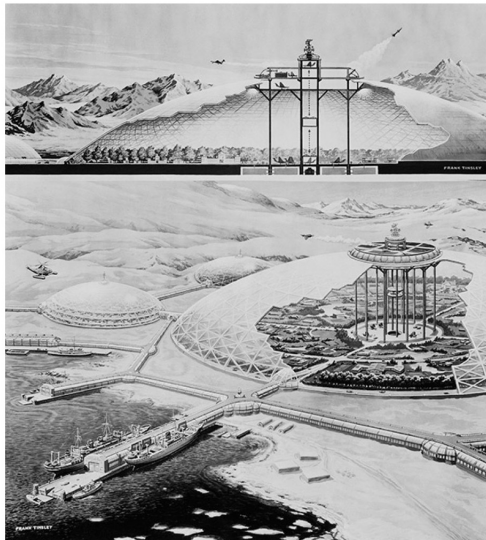
The design and construction of this monster globe is no short term proposition. It is a job for several generations—perhaps centuries!

The globe itself would be double-walled, with an armored outer skin and an inner pressure hull to hold the atmosphere. The space between would contain a tremendous area of hydroponic gardens, lit by artificial sun lamps and fed by chemical fertilizers for the manufacture of oxygen by natural plant processes. The outer skin would be pierced by rows of observation ports, radar domes and belts of solar heat plants.

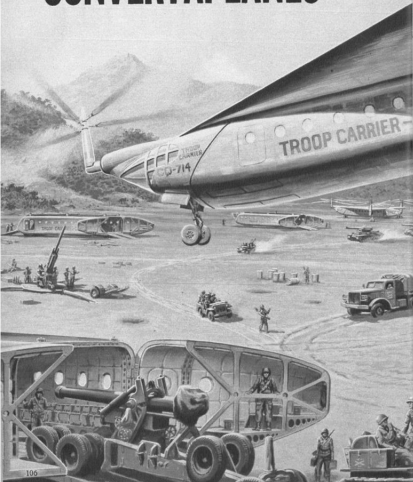
Science-fiction? Maybe so, but it's your vehicle if that's where you want to go. •

Illustration of a Climatized Arctic
Airbase from Mechanix Illustrated
Magazine

(Original Caption) Warm Bubble in the Arctic. New York, New York: A climatized arctic airbase, housed in huge plastic domes and heated by portable atomic fission units, is envisioned in the April issue of Mechanix Illustrated magazine. The magazine says that small plastic shelters recently demonstrated by the Marine Corps could be scaled up to almost any size. One 2,000 feet in diameter could house military installations, living quarters and the atomic heating plant according to the magazine. Smaller domes nearby, (bottom, left) could be used for service facilities, storage space and even gardens. Air operations from the giant plaster shelter would be centered on huge turntable platforms atop the dome (top). One platform would launch fighter planes and atomic bombers, and the other guided missiles. An elevator in the center would carry planes and pilots up and down.



Why Don't We Build... CONVERTAPLANES



With the airliner's speed and the helicopter's maneuverability, they would make air transportation safer and more practical.

By Frank Tinsley

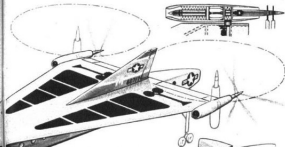
TODAY'S transport airplane is a highly efficient, rugged, comfortable and fast vehicle. It is safe, too, once it has reached its altitude. As a matter of fact it is about as safe as any other form of mass transportation. There are certain dangers inherent in flying, however. Chief among them is the fact that the plane must take off and land at high speeds on long runways. These moments of taking wing and returning to earth are critical and they become even more so in ground fogs, cross winds and snow. They are the moments in which 90



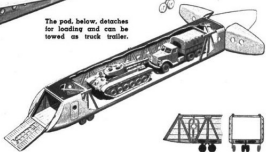
Earliest was Herrick's, above, in which biplane's upper wing was unlocked and made to rotate as in a helicopter.



Convertiplane described here would have three power units which could be swiveled upward to act as helicopter rotors. Engines would be interconnected by shafts so if one should fail, others could take over.



The pod, below, detaches for loading and can be towed as truck trailer.



Third convertiplane design, above, takes off and lands vertically. Flaps over horizontally for normal flight.



New York to California in Minus 3 Hours

The world's first Atomic Airliner, previewed here from plans under way for nuclear craft, may fly "forever" at 10,000 mph.

TOMORROW'S Atomic Airliner will easily shatter the 5000 mph-speed record for today's two-stage rocket, the "Wac Corporal." The liner could take off from New York at noon and flash into Los Angeles at 9 a. m. the same day—three hours before it started!

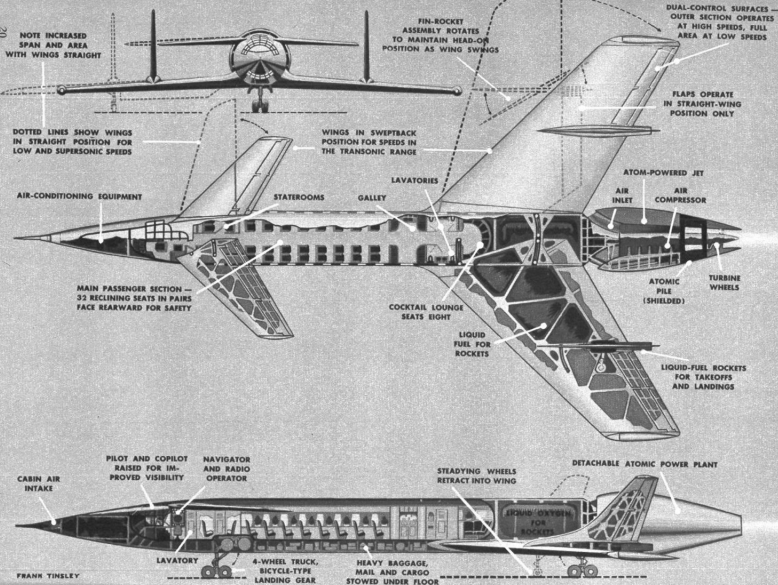
By flashing through time zones from Eastern Daylight to Pacific Standard, the Atomic Airliner would

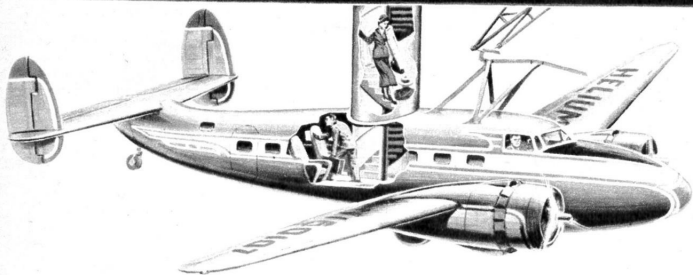
By Frank Tinsley

have no trouble gaining three hours on the clock.

That would include 40 minutes for a relatively slow climb to, and descent from, high altitude and a shade more than 15 minutes for actual cruising time at 10,000 mph.

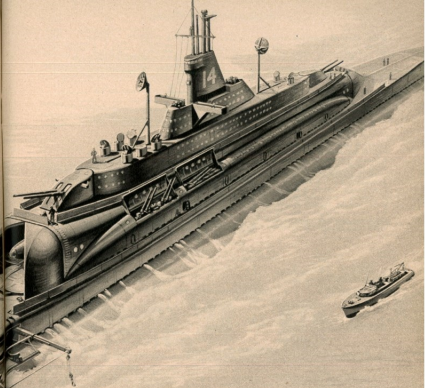
But even this terrific speed would not be the absolute maximum for the atom-powered plane. Such a craft might fly 12,000, 15,000, 18,000 mph—or even faster. Despite the subzero





why don't we build a

SUBMARINE AIRCRAFT CARRIER?



It would be practically invulnerable to atom-bomb attack and could be supported by a vast sub fleet.

By Frank Tinsley

AIRCRAFT and A-bombs are driving our navy beneath the waves! Already plans for giant submarine aircraft carriers are being discussed in official circles.

Sad as the thought may be to salty shellbacks of yesteryear, the submarine seems to be taking over sea supremacy. Perhaps the battlewagons with their great guns and shell-defying armor sounded their death rattle when the Prince of Wales, Repulse, and Bismarck were victims of torpedo planes

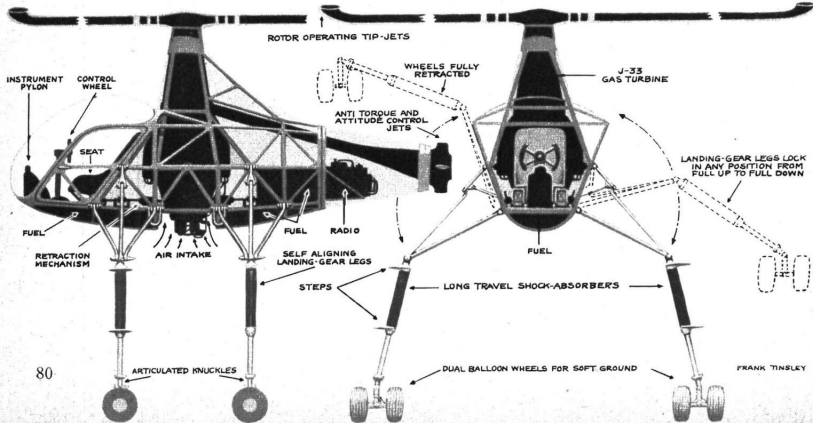


Sky Hook is Here!

A jet-helicopter tug that hovers like a hummingbird and has legs like a grasshopper.

BY FRANK TINSLEY

turn page.....



BIFURCATED AIR DUCT
TO TURBO-JET ENGINE

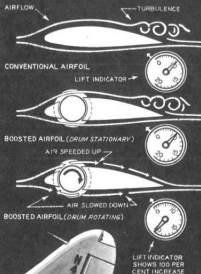
AIR COOLING DUCT
TO DRUM ENGINE

CONVENTIONAL PISTON-
ENGINE SPINS DRUMS

DRUM FLANGE ACTS AS
BOUNDARY LAYER STOP

ROTATING DRUM

TURBO-JET ENGINE
LOCATED AFT OF
CABIN SPACE



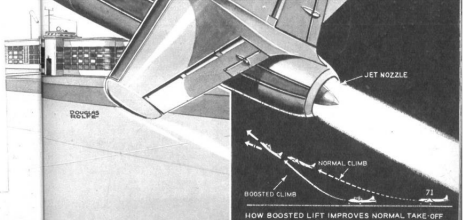
Spinning Wing Airliner

More wing lift and less drag are the major aims of aviation's researchers. Maybe the Magnus Wing will supply the answers.

ENGLAND'S aeronautical scientists may have a surprise in store for the rest of the flying world. Some years ago a prominent investigator, Anton Flettner, formulated the Magnus Effect—the strange behavior of a drum spinning in an airflow. Today with modern materials, equipment and wind tunnels, interest is once more directed toward this strange phenomenon.

The lift of an airplane wing is caused by the fact that the air passing over the top of a wing travels faster than that passing over the bottom. A law of science says that the faster air travels, the more its pressure is reduced. This difference in air pressure between the top and bottom of the wing results in lift. The addition of a rotating drum speeds up the air over the wing and slows up the air under the wing still more, resulting in an increase of 100 to 200 per cent. Hence, greater lift. Early tests show an increase of 100 to 200 per cent.

Here is how one of tomorrow's airliners may appear should further experiments prove the idea practical. The ship is powered by a conventional gas-turbine jet engine, while the drums are revolved by a separate piston engine. Small wings, heavy loads and quick take-offs would be its great advantages. *

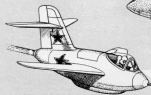


AIR PROGRESS

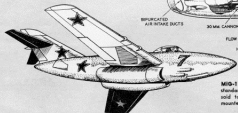
By DOUGLAS ROLFE

SOVIET AIR FORCE

Latter Day Types



Yak-21 rocket interceptor is an only slightly modified version of the original German Me 163. Chief difference appears to lie in the tail unit.

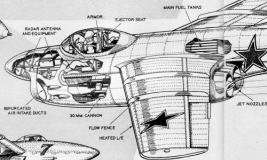


MIG-17. All-weather fighter reputed to be most recent development of MIG-15 type. Long nose houses radar equipment. Four 23 or 30-mm cannon.

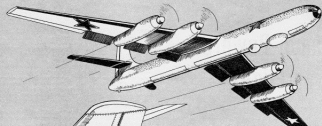
La-17. One of the more recent Red jet attack planes. Two-man crew, four 23 or 30-mm cannon.



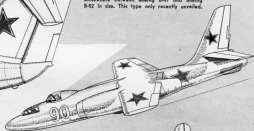
U-16B. The Yak-16 was first operational Red jet trainer and has now been modified as shown to act as a two-place jet trainer. Powered with a 2,000 hp plus jet engine.



MIG-15 Ma. All-weather version of the standard Korean MIG. Radar-equipped and said to employ a liquid-fuel rocket assist mounted under fuselage.



B-38. New swept-wing turbo-prop global bomber. Has radar bomb control equipment, is somewhere between Boeing B-47 and Boeing B-52 in size. This type only recently unveiled.



U-16B. Training version of a twin-jet attack bomber; night intruder version also exists. Both are equipped with radar, armed with cannon in nose and tail. Each engine develops approximately 5500 hp. Thrust, speed around 600 mph.



B-38. Four-jet medium bomber (above) also betrays marked German influence. It was probably first test flown between 1947 and 1948. Tu-70 (below). Most recent version of designer Tupolev's copy of basic B-29. Comes as both bomber, transport.

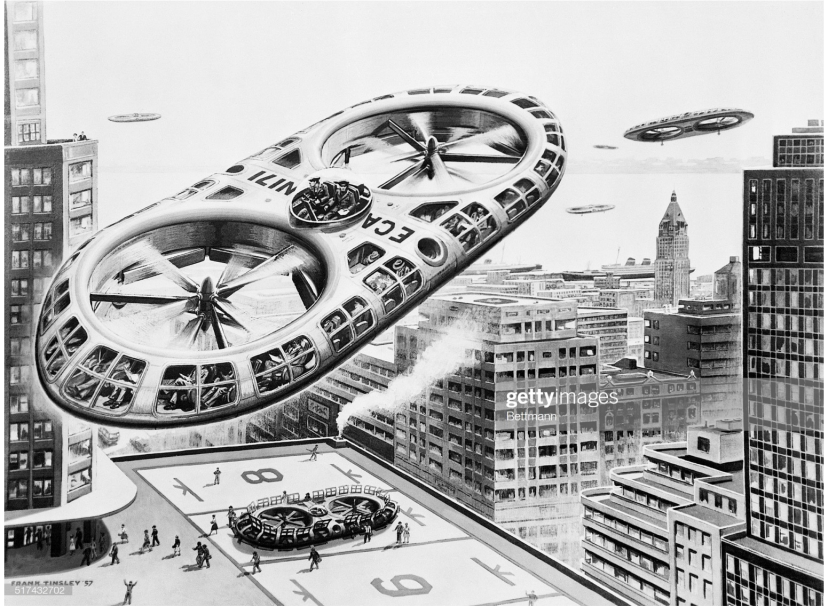


There is even less known about Soviet air power following World War II than during pre-war period covered last month. One thing is certain: thanks to advanced designs—British as well as German—and designers that were captured at

war's end, the Russians are in first ranks as regards jet aircraft. Probably the only operational jet whose details are known to outside world is the MIG-15—now already a back bomber. Their latest swept-wing bombers, unveiled at the

1954 May Day fly-by, cannot be illustrated in detail nor evaluated with any accuracy; the West just doesn't know much about them. (Their appearance, however, indicates the Reds have switched emphasis to the global bomber.) The

aircraft depicted on these pages have been carefully selected from known types in actual operational service and those reported to be, along with a couple of the earlier types that came out just after the war.



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Practical *MECHANICS*

1'6

AUGUST-1962

**CHANNEL TUNNEL
PROJECT**

**MIDGET 8 VOLT
ACCUMULATOR**

**PIPELINES
across BRITAIN**

A pistol type BUNSEN BURNER



CHANNEL TUNNEL PROJECT

PREFABRICATED

Described by W. L. Gay

WITHOUT delving into the numerous plans and suggestions for a cross channel link from England to Europe, which has been discussed over the last few decades, the latest idea of a bridge seems so impractical that I have been prompted to put forward a scheme, studied and planned by myself for fourteen years.

I refer to this because there will probably be a few unanswered queries due to space and the brevity of this article, but readers may rest assured that there is no difficulty that may occur to them not already taken into account and a perfectly simple explanation available. Many difficulties come to mind when one is contemplating such a project; cost, time element, human risk involved are perhaps the most important to overcome.

By the simple measure of reducing the time element, the cost of such a "link" would be greatly reduced, danger to human life also a costly contingency, when reduced to nil, also reduces the initial cost.

While endeavouring to describe my plan, I may have to be a little unorthodox because of the unusual design.

As the channel tunnel "Ports" are not contentious, I shall limit my article to that of the actual tunnel, as there are numerous excellent designs for "Ports" that, as long as they can be con-

nected to the proposed tunnel, do not cause congestion of traffic, either will be acceptable. However, my project is a "Prefabricated Tunnel" made on land on each side of the channel, in sections of 300 feet like huge cement and steel pipes are floated and submerged as the "tunnel". That is the simplicity of my plan.

A careful survey of the channel bed will be necessary to decide the most gradual shore lines, level bed and shortest route. Discrepancies can be either levelled off by filling hollows with rocks carried out by hoppers, or, sandbanks levelled by dredging (Fig. 1). While this is being carried out, huge plants are built on either side of the channel, consisting of rail yards, store and workshops, ready mixed concrete machines, and several slipways on which to construct the tunnel sections or units. See sketch.

The metal framework or girders, are manufactured and assembled in small transportable units then transferred to the assembly plant, where the construction of the skeleton of the tunnel section is carried out on several slipways (Fig. 3). When they reach certain stages of production they are "slid" to the next point of assembly and so on, until final launching into the sea.

The "skeleton" or "mattress" will be assembled together with various ducts, cables and pipelines.

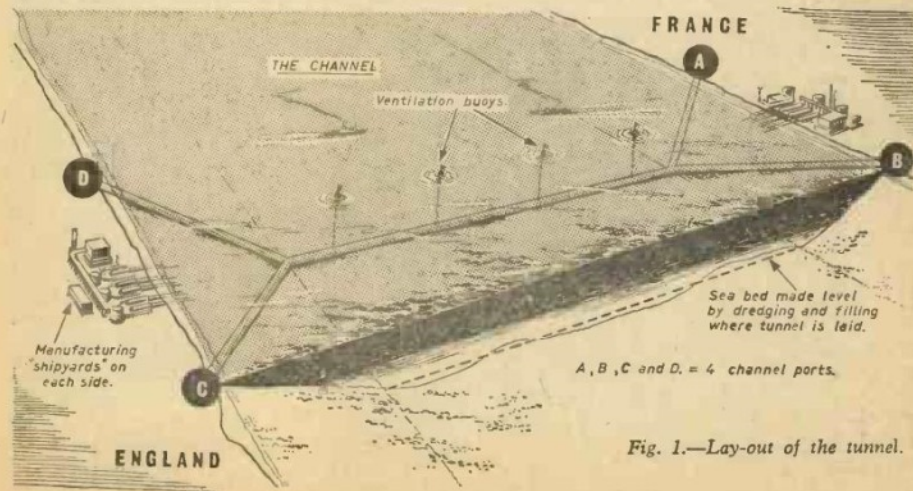


Fig. 1.—Lay-out of the tunnel.

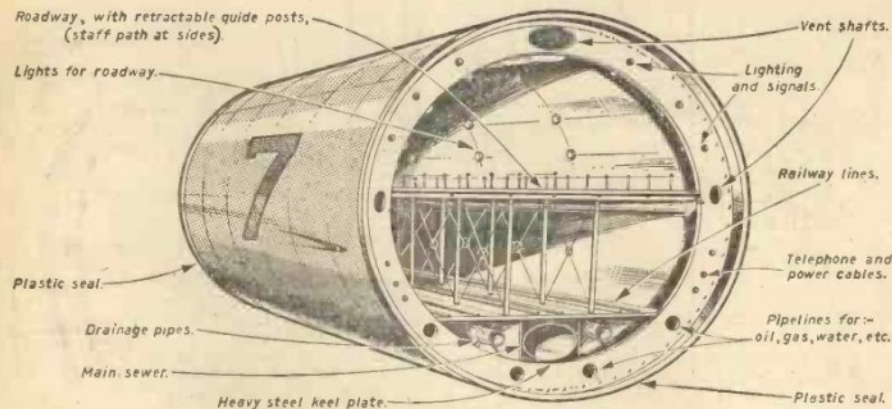
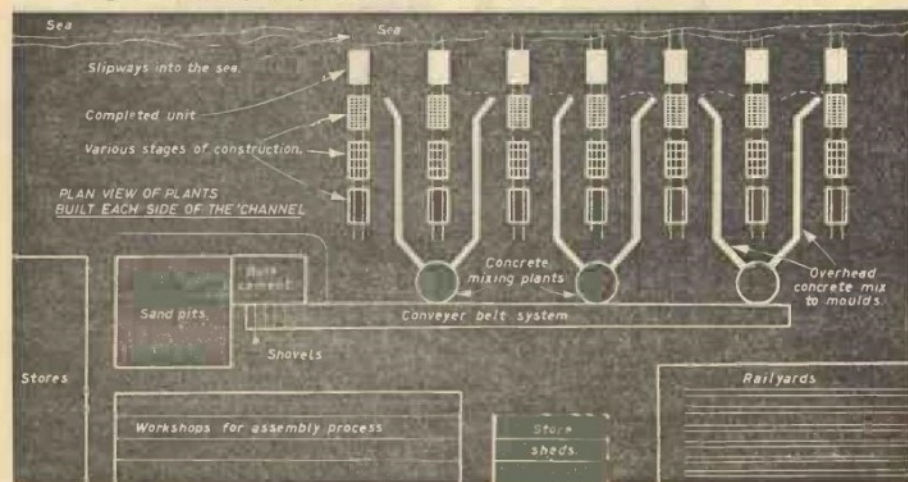


Fig. 2.—Cutaway view of the tunnel.

which will be used later for the conveyance of oil, water, ventilation, gas, etc. (Fig. 2). The unit will be bisected by a girder-like formation, that will eventually separate the tunnel section into two levels, the upper for road transport, the lower for rail. Under the railway line level, will be the drainage and "Rib" or "Keel" of the unit and this will act as the backbone of the tunnel (Fig. 2). When the initial assembly of the ribs or framework is completed, the unit is moved to the next position, where inner lining tiles are keyed to the structure for permanent fixture (incidentally the entire framework has been pre-stressed for maximum strains). Once the tiles are fitted to the framework, the outside of the unit is covered with steel plates to enable a mould to be formed. Another move is made when the unit, ready for the concrete, is "slid"

into the next position, where, from an overhead conveyor system, the special concrete mixture is poured into the mould, filling the cavity between the inner facing tiles and the outside steel plates. Once the concrete is set, the outside plates are removed and the unit moved to the final finishing stage. While the concrete is "curing" the completion of the inside of the section is finished, road surfaces laid consisting of pre-cast blocks bolted to the pre-determined fixtures, thus allowing for repair replacement due to wear and tear. Railway lines are also fitted to shoes located in the lower section (see Fig. 2), the railway lines will be of the overlapped joint principle and, as the temperature variation under water remains constant, the possibility of buckling is negligible, allowing for close tolerances and a vibration free ride is guaranteed.

Fig. 3.—Details of the plants where sections of the tunnel would be manufactured.



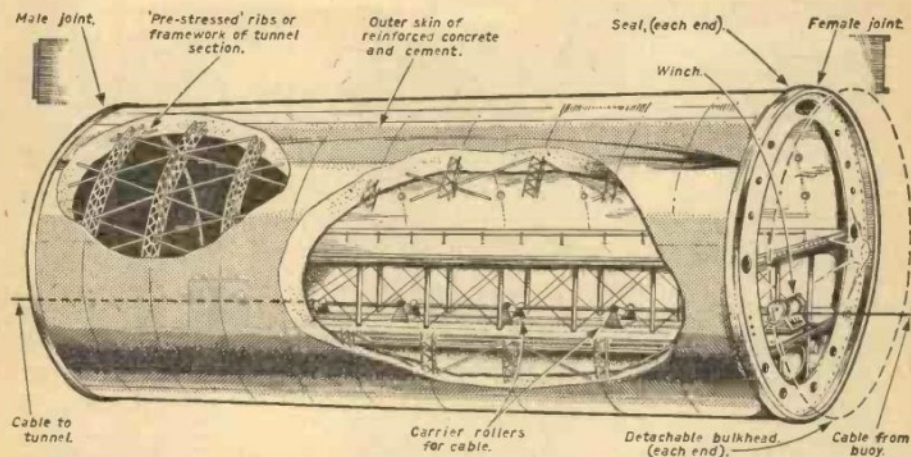


Fig. 4.—Showing the framework of a section of the tunnel. The winch, carrier rollers for cable and bulkhead doors are removed when section is in position.

All electric lights, power lines, cables, telephones, shafts and pipe lines are tested and, once completed, the ends are sealed with detachable bulkheads. The ends of the tunnel section are fitted with a plastic unperishable seal of a male and female design, ensuring a positive water and air tight seal.

Once ready and sealed, the unit is launched into the sea, then towed to the marker buoy or ship situated at the end of the tunnel or to the previously fitted unit, as required (Fig. 5).

For economical reasons and to overcome any expensive point at the centre which would involve under-sea divers, the tunnel is started above water-line on one side and passes underwater until it rises above water on the other side. Tunnel units will be made on both sides and although a greater "tow" will be involved from one side at the start, the situation changes as the tunnel nears the other coast.

The method of connecting the unit to the pre-fitted section is simple and involves no human risk,

trained crews "man" the unit, using the upper level as their headquarters and pass through the bulkhead doors a cable which is complete with power lines. By drawing the cable to a winch, specially fitted to the railway lines, they pass the free end back out of the other bulkhead and refix it to the marker buoy or ship. Once this is done, similar to threading a cord through a large bead, the lower drain level is flooded to lessen the buoyancy of the unit, then by starting the winch driven by power from the power lines, the unit pulls itself under water along the cable (see Fig. 6), until it is finally touching the previously fitted unit. By moving ballast weights from side to side in the new unit until connecting link bolts, large threaded steel bolts are driven through a thin rubber gasket and into the other unit, where nuts are made secure and tightened until a water and air tight seal is obtained at the plastic rings. Once sufficient bolts are tightened to hold the unit in place, the crews dismantle the bulkhead doors separating the units and the process of final fixture is made by other

Fig. 5. — A section being towed into position.

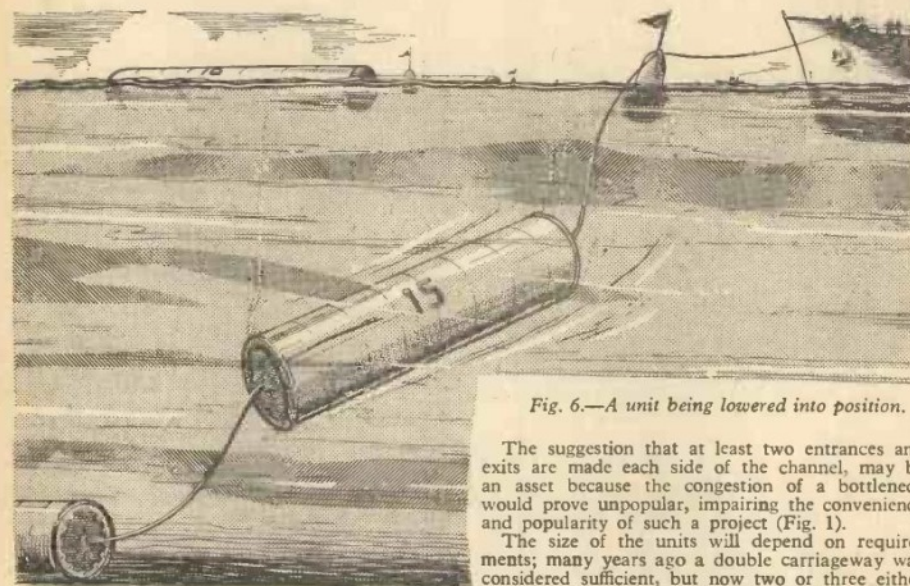
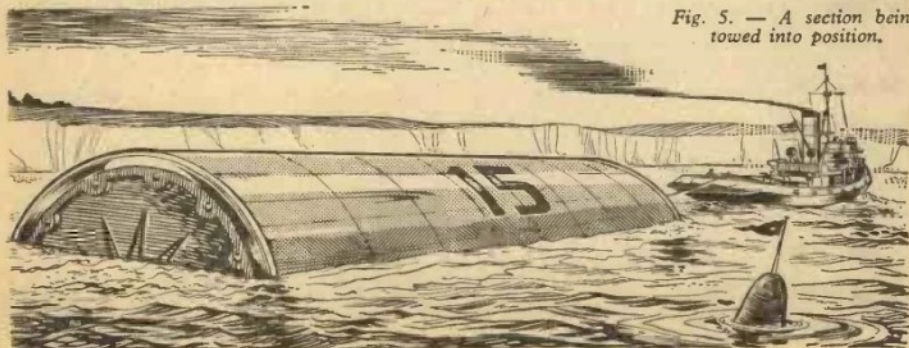


Fig. 6.—A unit being lowered into position.

The suggestion that at least two entrances and exits are made each side of the channel, may be an asset because the congestion of a bottleneck would prove unpopular, impairing the convenience and popularity of such a project (Fig. 1).

The size of the units will depend on requirements; many years ago a double carriageway was considered sufficient, but now two or three either way would have to be considered, but as an additional convenience, the separating barricades or guide posts are made retractable and the widening of the roadway for the busier direction, would be controlled by the mere operating of a switch (Fig. 2). On each side of the main concourse, will be a path for the use of "tunnel personnel" for servicing switch gear, policing traffic or for the removal of obstructing broken down vehicles to await towing from the tunnel.

Ventilation, once a major worry where a deep tunnel was concerned, is simply an inclusion of pre-determined units, where a hatchway is incorporated, to house a ventilation buoy, which is freed to float and allow for pumping foul and fresh air in and out. The speed of this ventilation will be controlled by the installation of a series of "electronic eyes" where the density of smoke will increase or decrease the amount of ventilation required. Smoky vehicles are similarly policed at

(Concluded on page 523)

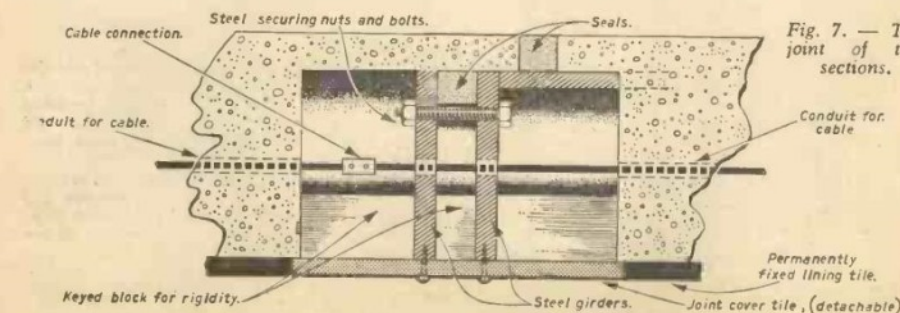


Fig. 7. — The joint of two sections.

SCIENCE and MECHANICS

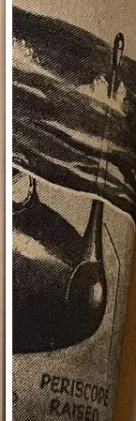
25¢
AUGUST

The Magazine That Shows You How

Submarine that Flies
see page 74



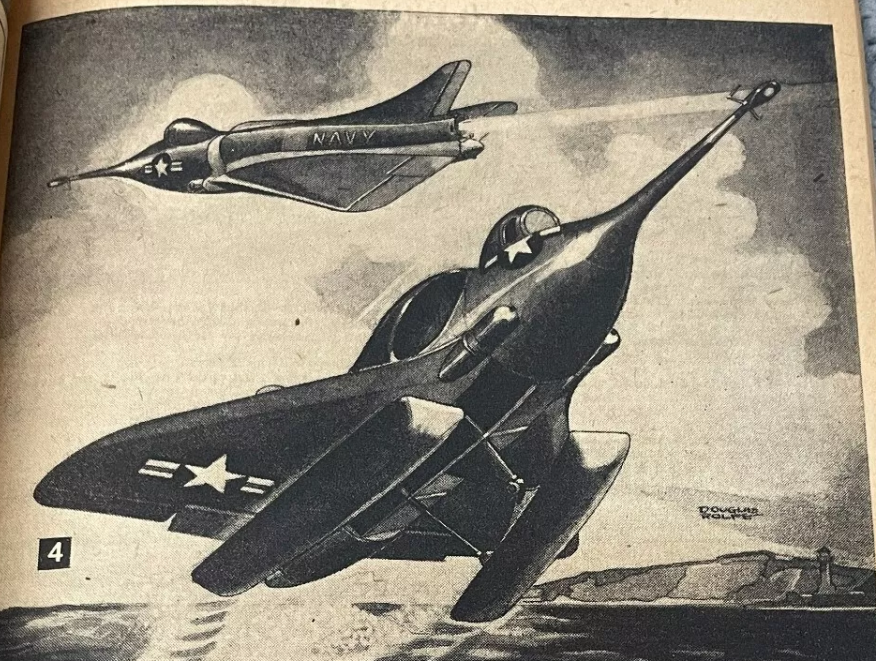
Flies



NORMAL UNDERWATER CRUISING WITH PERISCOPE RAISED AND HORIZON



MECHANICS



HURTLING at 800 to 900 mph, this outwardly conventional jet aircraft, invented by Vice President Donald B. Doolittle, vice president of the All American Engineering Co., Wilmington, Del., zeroes in on its general target or exploration area some 2000 miles from its home base. Long before the pilot actually sights his destination, he starts a marine power plant in the plane's belly, opens the ballast tanks (if his model has them), adjusts air pressure in his cabin, and lowers the hydro-lift landing gear (Fig. 3). As the plane skitters onto the ocean's surface, the flyer triggers sliding doors across all its air vents.

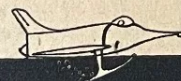
At the touch of a button, the hinged conical cover on the marine propeller compartment—the prop is now spinning—swings up and back, seal-

⑤ FULLY SUBMERGED, HOMING TORPEDOES RELEASED TO TARGET. NORMAL CONTROL SURFACES NOW SERVE TO MANEUVER CRAFT BELOW SURFACE

⑥ HYDROLIFT GEAR LOWERED, TANKS BLOWN AND ALL AIR (JET) VENTS OPENED

⑦ TAKE-OFF JET POWER NOW RESUMED

⑧ FULLY AIRBORNE SKIS RETRACTED



SURFACING AND TAKING OFF

AUGUST, 1956

Is the Downsize Cadillac Still a Great Road Car?

Mechanix ILLUSTRATED

THE HOW-TO-DO MAGAZINE

MAY 1977/ONLY **75c**
06328

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Supersonic Speeds
With No Sonic
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The Amazing Comeback
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Submarines That Swim

IF AN ENEMY can hear our submarines, he can kill them. And with the super sound-detection equipment now in use any enemy could pick up the throb of underwater propellers several miles away.

Then it's just a simple matter of a depth charge or underwater missile and it's curtains for sub and crew.

What's the solution to this lethal problem? Obviously, submarines that don't make noise. Are there such things?

Yes, there are at least designs, but they're like no submarines you've ever seen. The Navy is currently considering several weird new subs, all of which resemble fish and other inhabitants of the ocean.

Some look like long wiggly water snakes, like the one on the opposite page, and propel themselves through the sea with whip-like movements of flexible tails.

Others look like manta rays and have broad fins that they flip up and down to move themselves noiselessly through the depths.

But perhaps the most promising and strangest new submarine of all is one that quivers. It's segmented and looks like some monstrous other-worldly fish. No propellers, rudders or planes interrupt its sleek lines. And its skin pulsates in a smooth rhythmic pattern that flows from fore to aft.

It's this undulation, named Dermadrive by its inventors, that propels the craft so efficiently and, more importantly, so silently.

No such submarine actually exists—yet. Dermadrive is a project developed by two young marine engineering students at the University of Michigan—Howard Alberty and Ernest Jaquet. But their calculations and their rough working model exhibit so much promise that the U.S. Navy is showing more than a casual interest. And though

Dermadrive may seem like a far-out idea for the Navy, it's actually typical of the many projects now underway to design a submarine that swims like a fish, not a boat.

Remember that old movie about submarine warfare, *Run Silent, Run Deep*? Well, its title may have been catchy but it certainly wasn't accurate. Subs may run deep, but they don't run silent. In fact, one of the greatest weaknesses of the present-day submarine is the noisy propellers, which make the submarine an easy target for surface vessels.

Engineers have tried to dampen the noise by insulating or isolating the propellers, but to no avail. Another problem with the propeller is the loss of efficiency caused by cavitation. As the water tries to pull away from the whirling propeller, it forms a partial vacuum. This means considerable drag.

Jacquet and Alberty decided the old propeller had reached the end of its road. An entirely new concept of propulsion was needed. And what better source of inspiration than that most efficient of submarines—the fish!

In their research on marine life the young inventors came across two unique species: the skate and the gymnotid. Each pushes itself through the water by wriggling a ribbonlike fin. As the fin undulates in a rhythmic fore-to-aft pattern, it pushes backwards against the surrounding water. This, in turn, moves the fish forward.

Alberty and Jaquet took this principle and set out to build a mechanical fish. They designed a flexible skin around the submarine's traditional, rigid pressure hull. Then they divided the entire length of the submarine body equally with 17 pairs of magnetic rings. Each pair consists of a smaller, electrically magnetized ring inside a larger permanently magnetized ring.

The inner rings are attached to the rigid-pressure hull. The outer rings are attached to the inside of the flexible skin. The outside rings are split into four equal sections, or quadrants. Alternating the direction of current flow around the electromagnetic inner rings causes them alternately to attract and repel the outer rings.

As the outer [Continued on page 161]



DERMADRIVE SUB above propels itself by undulating its synthetic rubber skin. The sub below swims by whipping its tail.





SCISSORS-WING FLIGHT PROFILE

The new Scissors-Wing Transport represents a major advancement in boost-glider technology. This unique glider has a flight configuration at lift-off which looks like that of a rocket. It launches straight up with its main wing held parallel to the body tube. Shortly after reaching apogee, the engine's ejection charge jettisons the internal power pod causing a weight shift and the pivoting of the main wing to a perpendicular glide position. Then, settling into a gentle glide, the Scissors-Wing begins its majestic descent to Earth. The power pod is recovered via parachute.

GYROC

Skill Level 3

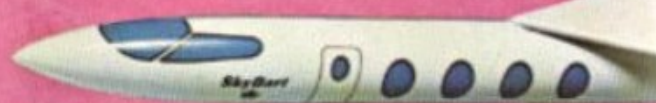
An amazing and unique "helicopter" recovery system makes the Gyroc a must for your fleet. Unusual appearance.

Specifications

Length 9.8" (24.9cm)
Body Dia. 0.736" (18.7mm)
Weight 0.6 oz. (17 gr)
Shipping wt. 5 oz.

Recommended Engines

1/2A6-2 A8-3
B6-4 C6-5
Use 1/2A6-2 for first flights.
Cat. No. K-24 ... \$1.50



Specifications

Wing Span 12.6" (31.8cm)
Length 15.8" (40cm)
Body Dia. .976" (24.8mm)
Weight 1.25 oz. (35.4 gr)
Weight of Glider with Pod 2.5 oz. (70.8 gr)
Shipping wt. 12 oz.

NEW SCISSORS-WING TRANSPORT

Skill Level 3

This exciting bird introduces the revolutionary new Scissors-Wing concept. Features super SST styling and high flight reliability. Capable of glide times of more than 60 seconds. Internal ejection power pod features vertical stabilizer fins. Comes ready-to-assemble with die-cut parts and two-color decals.

Specifications

Length 22.75" (57.79cm)
Body Dia. 0.976" (2.48cm)
Wing Span 15.75" (40.01cm)
Weight w/pod 2.34 oz. (66.9 gr)
Weight w/o pod 1.73 oz. (49.5 gr)
Shipping wt. 16 oz.

Recommended Engines

B4-2 (for first flight) B6-2 C6-3
Cat. No. 1265 ... \$4.95

NEW!



Engines not included

Recommended Engines

A8-3 B4-2 B6-2 C6-3
Cat. No. K-57 ... \$4.50

SKYDART

Skill Level 4

This totally new rocket-boosted glider design features an internal rear ejection power pod. Streamlined "Business SST" body styling results in a high performance glide along with good reliability. Parachute recovery brings power pod back safely. Pat. No. 3,157,960

Specifications

Wing Span 12.6" (31.8cm)
Length 15.8" (40cm)
Body Dia. .976" (24.8mm)
Weight 1.25 oz. (35.4 gr)
Weight of Glider with Pod 2.5 oz. (70.8 gr)
Shipping wt. 12 oz.